

## CLAIMS

1. A high-speed optical data link comprising:

a system circuit board;

a first ASIC mounted on the system circuit board, the first ASIC including a clocking and equalization/retiming function for one of sending data and recovering distorted data; and

a second ASIC mounted on the system circuit board and electrically coupled to the first ASIC for conveying electrical signals therebetween, the second ASIC including a clocking and equalization/retiming function for one of sending data and recovering distorted data.

2. A high-speed optical data link as claimed in claim 1 further including an optical receiver having a photo diode, a trans-impedance amplifier and a post-amplifier, the post amplifier electrically coupled to one of the first ASIC and the second ASIC.

3. A high-speed optical data link as claimed in claim 2 further including an input terminal, for receiving optical information from external light sources, coupled to the photo diode and an output terminal, for providing output electrical signals in accordance with the received optical information, coupled to the post-amplifier.

4. A high-speed optical data link as claimed in claim 1 further including an optical transmitter having a laser diode and a laser driver, the laser driver electrically coupled to one of the first ASIC and the second ASIC.

5. A high-speed optical data link as claimed in claim 4 further including an input terminal, for receiving input electrical information, coupled to the laser driver and an output terminal, for providing output optical signals to external optical receivers in accordance with the received electrical information, coupled to the laser.

6. A high-speed optical data link as claimed in claim 1 further including board level IC chips electrically

coupled to one of the first ASIC and the second ASIC.

7. A high-speed optical data link comprising:

a system circuit board;

a first ASIC coupled to convey electrical information to a remote circuit and a second ASIC electrically coupled together for conveying electrical signals therebetween through electrical traces on the system circuit board; and

a fiber optic receiver module mounted on the system circuit board, the receiver module including a photo diode positioned to receive optical signals from a remote source, a trans-impedance amplifier electrically coupled to the photo diode, a post-amplifier electrically coupled to the trans-impedance amplifier, and the second ASIC coupled to the post-amplifier, the second ASIC including a clocking and equalization/retiming function for data transmission, the first ASIC on the system circuit board including a function for recovering distorted data through the same clocking function as provided by the second ASIC.

8. A high-speed optical data link as claimed in claim 7 wherein the remote circuit includes at least one board

level IC chip electrically coupled to the first ASIC.

9. A high-speed optical data link as claimed in claim 7 wherein the remote source of the optical signals includes an optical fiber.

10. A high-speed optical data link comprising:

a system circuit board;

a first ASIC coupled to receive electrical information from a remote circuit and a second ASIC electrically coupled to the first ASIC for conveying electrical signals therebetween through electrical traces on the system circuit board; and

a fiber optic transmitter module mounted on the system circuit board, the transmitter module including a laser positioned to convey optical signals to a remote optical receiver, a laser driver electrically coupled to the laser, and the second ASIC electrically coupled to the laser driver, the first ASIC on the system circuit board including a clocking and equalization/retiming function for data transmission, and the second ASIC including a function for recovering distorted data through the same clocking function as provided by the first ASIC.

11. A high-speed optical data link as claimed in claim 10 wherein the remote circuit includes at least one board

level IC chip electrically coupled to the first ASIC.

12. A high-speed optical data link as claimed in claim 10 wherein the remote optical receiver to which the optical signals are conveyed includes an optical fiber.

13. A high-speed optical data link comprising:

a system circuit board;

a first ASIC mounted on the system circuit board and coupled to convey electrical information to a remote circuit and to receive electrical information from a remote circuit, and a second ASIC mounted in an optical module and electrically coupled to the first ASIC for conveying electrical signals therebetween through electrical traces on the system circuit board;

a fiber optic receiver mounted in the optical module, the receiver including a photo diode positioned to receive optical signals from a remote source, a trans-impedance amplifier electrically coupled to the photo diode, and a post-amplifier electrically coupled to the trans-impedance amplifier and to the second ASIC, the second ASIC including a clocking function and equalization/retiming function for data transmission, the first ASIC including a function for recovering distorted data through the same clocking function as provided by the second ASIC; and

a fiber optic transmitter mounted in the optical

module, the transmitter including a laser positioned to convey optical signals to a remote optical receiver, a laser driver electrically coupled to the laser and to the second ASIC, the first ASIC including a clocking function and equalization function for data transmission, and the second ASIC including a function for recovering distorted data through the same clocking function as provided by the first ASIC.

14. A high-speed optical data link comprising:

a system circuit board having electrical traces;

an IC mounted on the system circuit board and coupled to convey electrical information from up level data management circuitry to an optical transceiver module and to receive electrical information from the optical transceiver module and convey to the up data management circuitry, and an ASIC mounted in the optical transceiver module and electrically coupled to the IC on the system circuit board through the electrical traces on the system circuit board for conveying electrical signals therebetween;

a fiber optic receiver mounted in the optical transceiver module, the receiver including a photo diode positioned to receive optical signals from a remote optical source, a trans-impedance amplifier electrically coupled to the photo diode, and a post-amplifier electrically coupled to the trans-impedance amplifier and to the ASIC in the optical transceiver module, the ASIC including one of a clocking function and an equalization/retiming function for data transmission; and

a fiber optic transmitter mounted in the optical transceiver module, the transmitter including a laser positioned to convey optical signals to an external optical receiver, a laser driver electrically coupled to the laser and to the ASIC in the optical transceiver module, the ASIC in the optical transceiver module including an equalization/retiming function for recovering distorted data for data transmission through the laser.

15. A method of electrically communicating information at rates equal to or higher than 10-gigabits per second on a circuit board comprising the steps of:

providing a system circuit board including a first position and a second position;

receiving electrical signals from an external source at the first position on the system circuit board;

clocking and equalizing/retiming the electrical signals on the system circuit board for data transmission;

conveying the equalized signals to the second position on the system circuit board; and

receiving the equalized signals at the second position and recovering distorted signals using a clock recovery and equalization/retiming step.

16. A method of electrically communicating information at rates at least equal to 10-gigabits per second on a circuit board comprising the steps of:

providing a system circuit board including an optical transmitter module with a laser diode and a laser driver;

receiving electrical signals from an external source at a first position on the system circuit board;

clocking and equalizing/retiming the electrical signals on the system circuit board for data transmission;

conveying the equalized signals to a second position on the system circuit board through electrical traces;

receiving the signals at the second position and recovering distorted signals using a clock recovery and equalization/retiming step; and

conveying the recovered equalized signals to the laser driver.

17. A method as claimed in claim 16 wherein the step of receiving electrical signals from the external source includes providing at least one board level IC chip electrically coupled to the first ASIC for supplying the electrical signals.

18. A method as claimed in claim 16 including in addition a step of providing an optical fiber optically coupled to the laser for receiving optical signals therefrom.

19. A method of electrically communicating information at rates at least equal to 10-gigabits per second on a circuit board comprising the steps of:

providing a system circuit board including an optical receiver module with a photo diode, a trans-impedance amplifier, and a post-amplifier;

receiving optical signals from an external source with the photo diode, converting the optical signals to electrical signals and amplifying the electrical signals in the trans-impedance amplifier to provide amplified electrical signals at an output of the post-amplifier;

clocking and equalizing/timing the amplified electrical signals at a first position on the system circuit board for providing equalized signals;

conveying the equalized signals to a second position on the system circuit board;

receiving the signals at the second position and recovering distorted signals using a clock recovery and equalizing/retiming step; and

conveying the recovered electrical signals from the second position to an external source.

20. A method as claimed in claim 19 wherein the step of conveying the recovered electrical signals from the second position to the external source includes providing at least one board level IC chip electrically coupled to the first ASIC for receiving the recovered electrical signals.

21. A method as claimed in claim 19 wherein the step of receiving optical signals from an external source includes optically coupling an optical fiber to the photo diode for receiving optical signals therefrom.

22. A method of electrically communicating information at rates at least equal to 10-gigabits per second on a circuit board comprising the steps of:

providing a system circuit board including an optical transceiver module with a photo diode, a trans-impedance amplifier, a post-amplifier, a laser diode driver, a laser diode, and an ASIC;

receiving optical signals from an external source with the photo diode, converting the optical signals to first electrical signals and amplifying the first electrical signals in the trans-impedance amplifier to provide amplified first electrical signals at an output of the post-amplifier;

clocking and equalizing/retiming the amplified first electrical signals in the optical transceiver module on the system circuit board for providing equalized first signals in a first position on the system circuit board;

conveying the equalized first signals from the first position to a second position on the system circuit board;

receiving the equalized first signals at the second position, clocking the equalized first signals to provide recovered first electrical signals, and conveying the recovered first electrical signals from the second position to up level data management circuitry;

receiving second electrical signals from the up level data management circuitry, clocking and equalizing/retiming the second electrical signals for providing equalized second signals in the second position on the system circuit board;

conveying the equalized second signals to the optical transceiver by way of the first position on the system circuit board through electrical traces on the system circuit board; and

clock recovering equalized second signals in the first position using the ASIC in the optical transceiver, sending the recovered second signals to the laser driver, and generating optical signals at the laser diode modulated with the recovered second signals to send the optical signals to a remote external optical receiver.